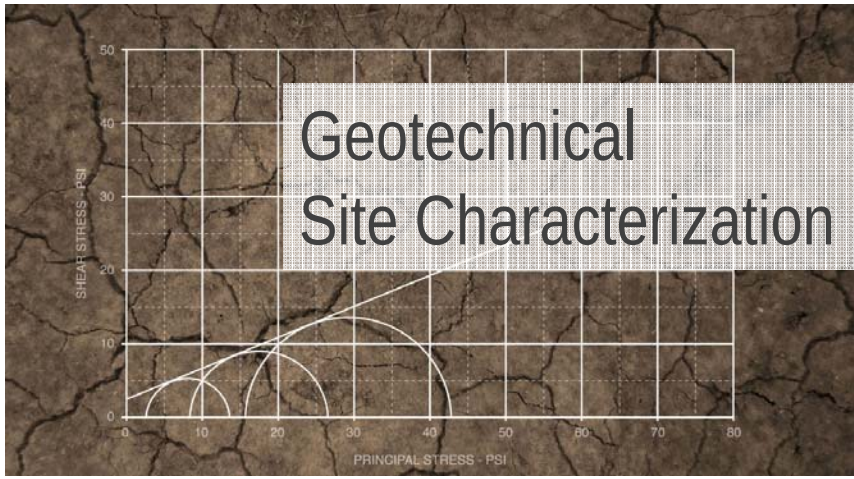
The Start *Essential* to Every Project



1 Data Mining

2 Methods Consulting

3 Field Explorations

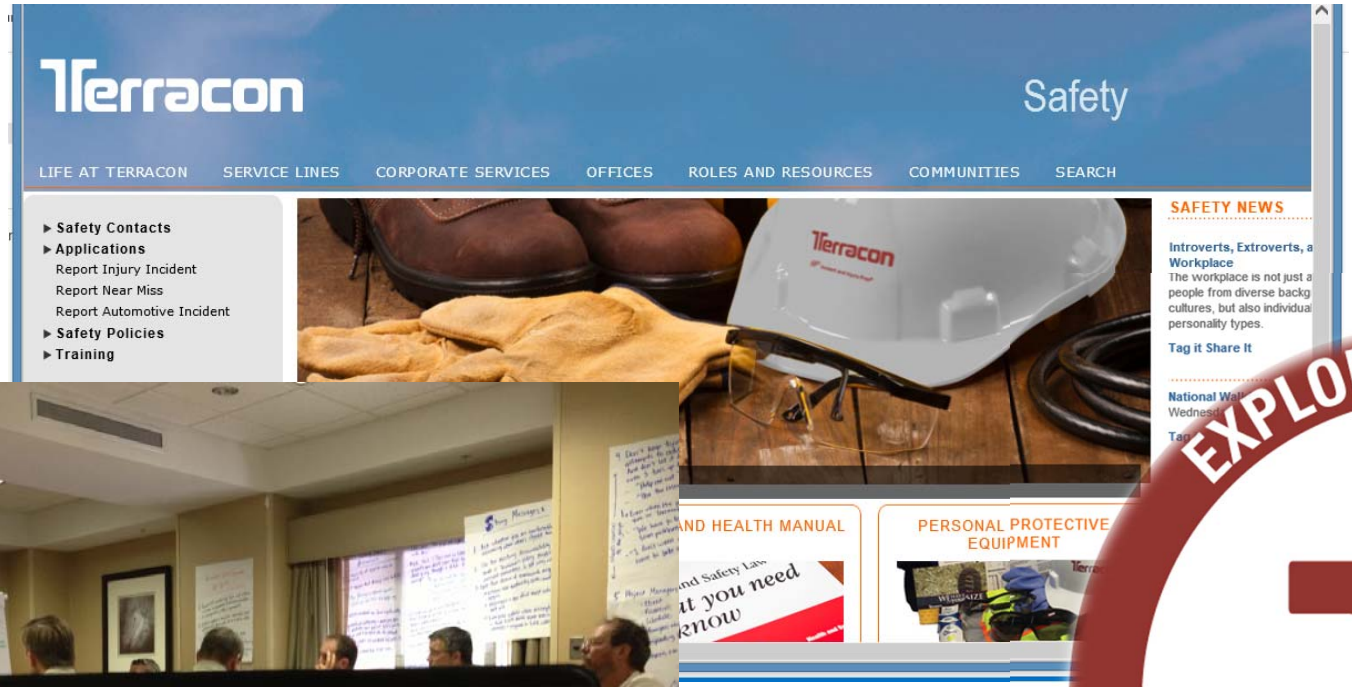
4 Laboratory Testing

5 Characterize and Report

GEOHAZARDS

- Landslide
- Rockfall
- Underground Mine Subsidence
- Karst Subsidence

Geotechnical Site Characterization



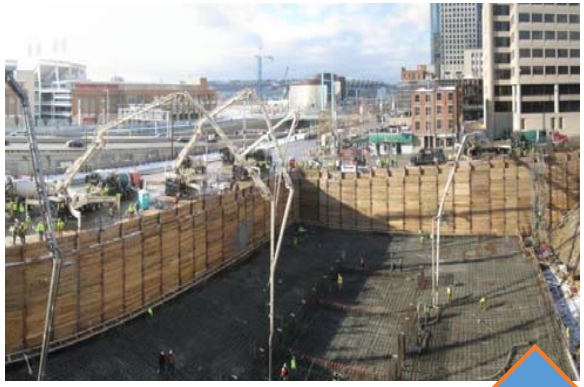
EXPLORATION TEAM

... in that order

SAFETY QUALITY PRODUCTION

Geotechnical Engineering

Field Exploration



Construction Observation

Laboratory Testing

Analysis and Design

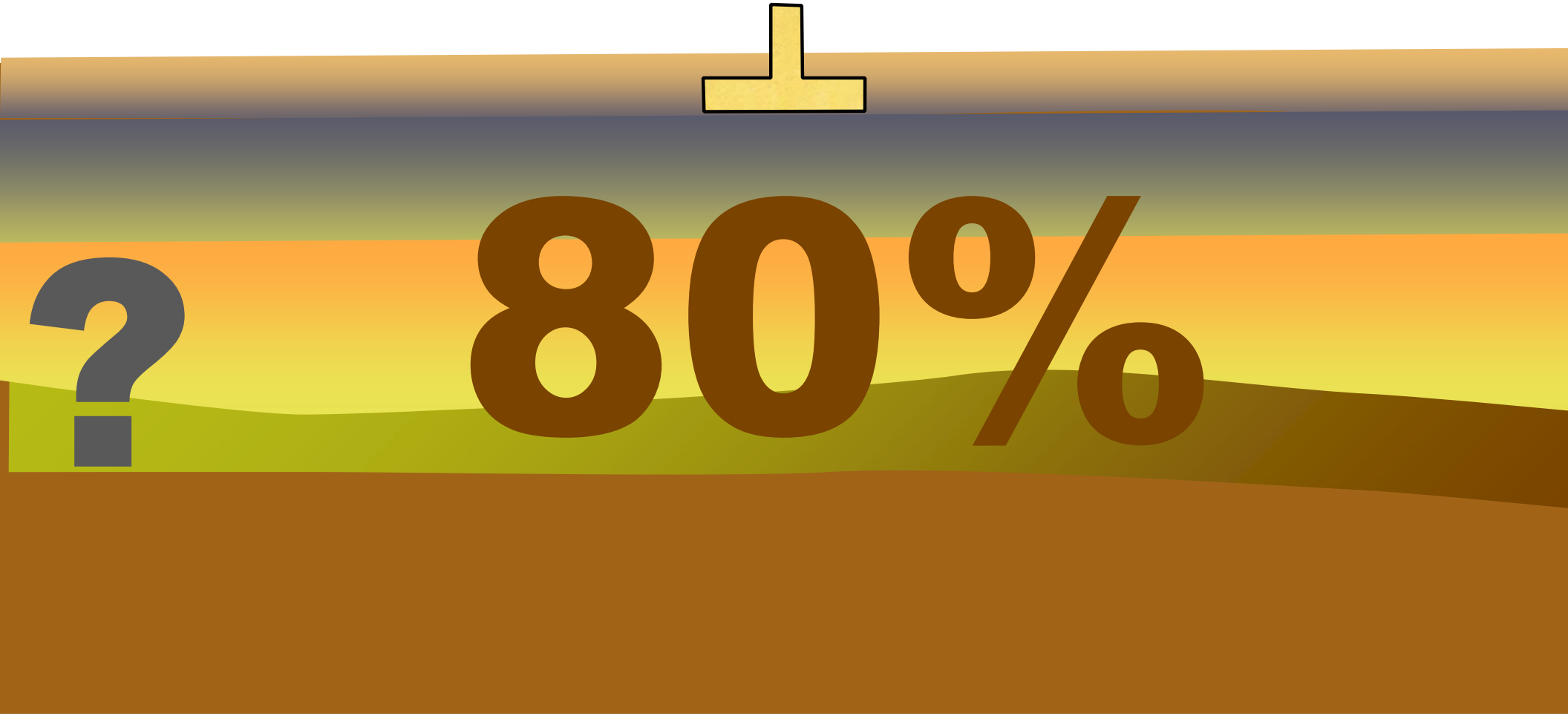
Geotechnical Engineering

Field Exploration

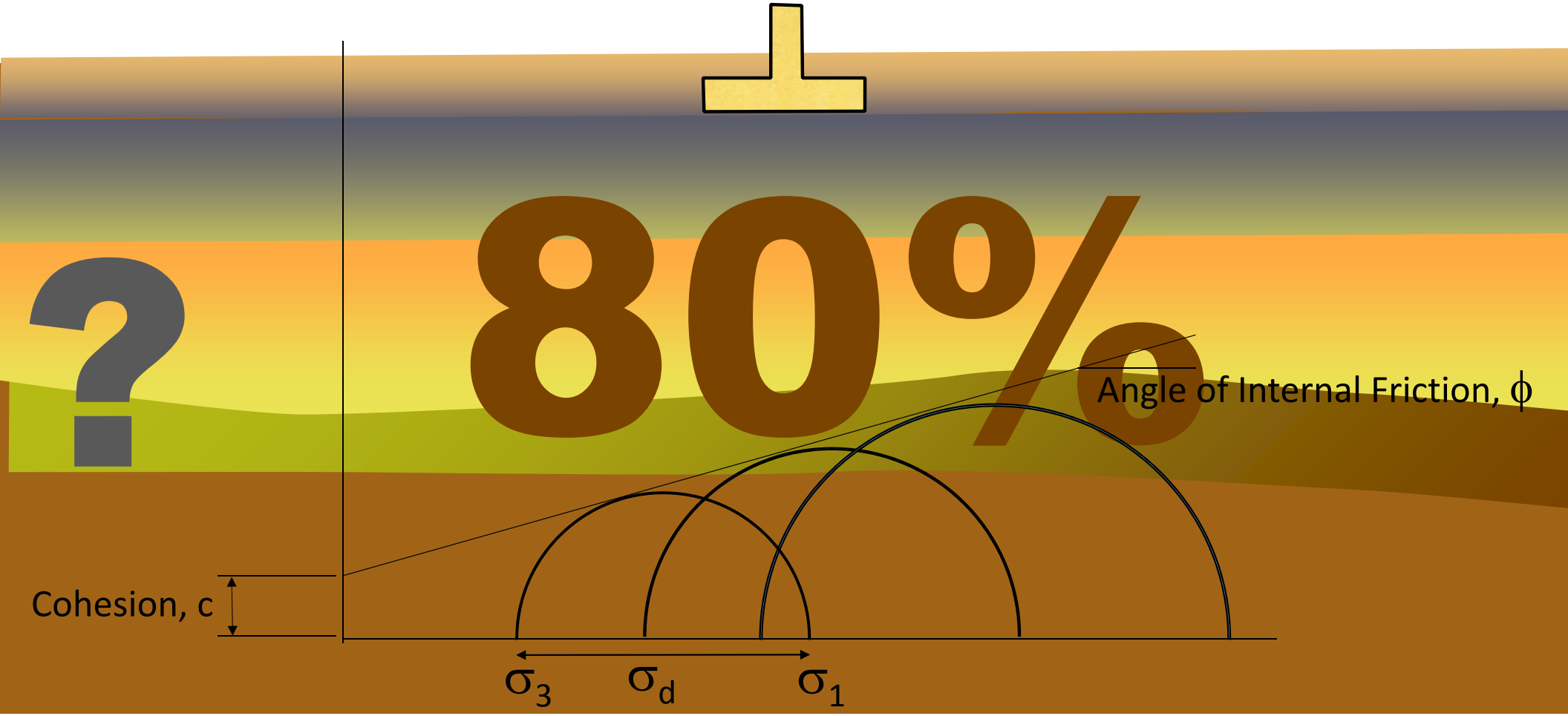
Laboratory Testing

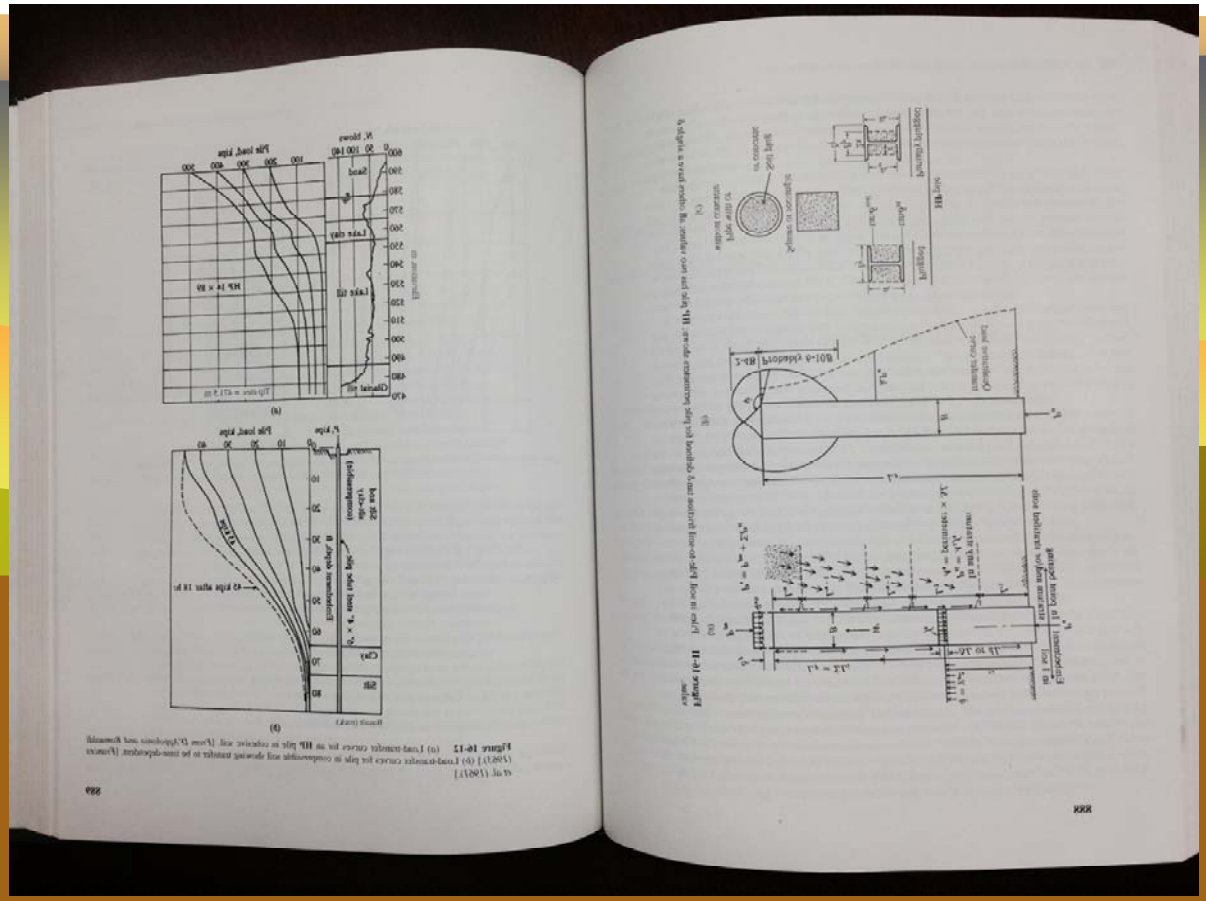
Geotechnical Site Characterization

Differing Subsurface Conditions



Differing Subsurface Conditions





Ground Improvement

?

Field Exploration

Laboratory Testing

Geotechnical Site Characterization

4 Segments of Geotechnical Engineering

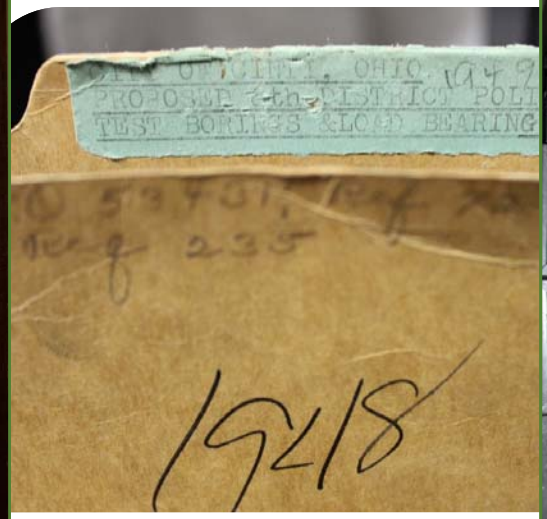
5 Steps of …

Geotechnical Site Characterization

STEP 1 – DATA MINING

1 Data Mining
2 Methods Consulting
3 Field Explorations
4 Laboratory Testing
5 Characterize and Report

Geotechnical Site Characterization



STEP 1 – DATA MINING

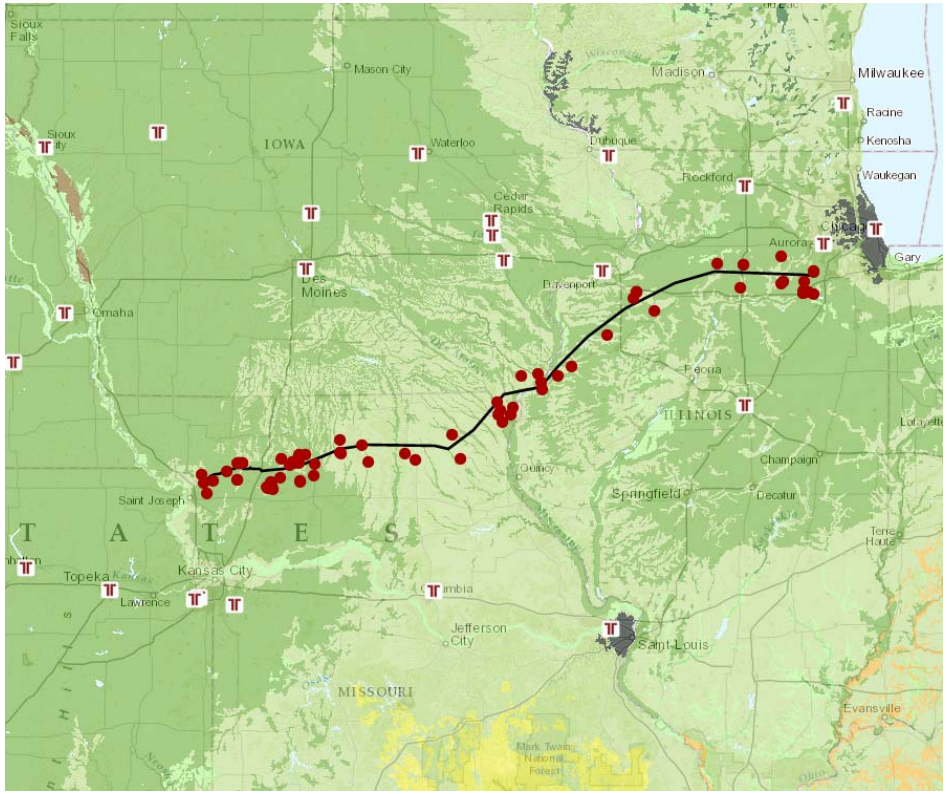
1 Data Mining | 2 Methods Consulting | 3 Field Explorations | 4 Laboratory Testing | 5 Characterize and Report

Valuable Historic Data

Activated for Useful Access

STEP 1 – DATA MINING

1 Data Mining | 2 Methods Consulting | 3 Field Explorations | 4 Laboratory Testing | 5 Characterize and Report



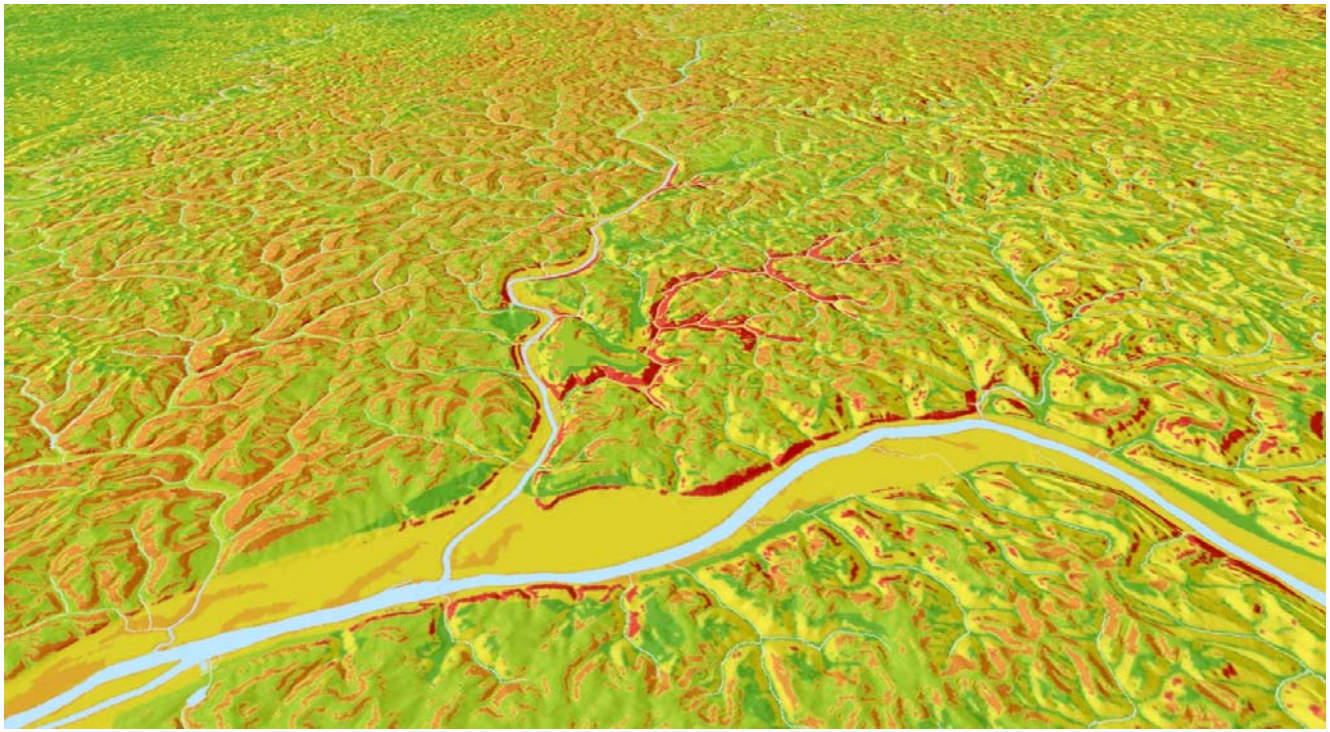
Valuable Historic Data

Activated for Useful Access

Enhanced with GIS Information

STEP 1 – DATA MINING

1 Data Mining | 2 Methods Consulting | 3 Field Explorations | 4 Laboratory Testing | 5 Characterize and Report



Valuable Historic Data

Activated for Useful Access

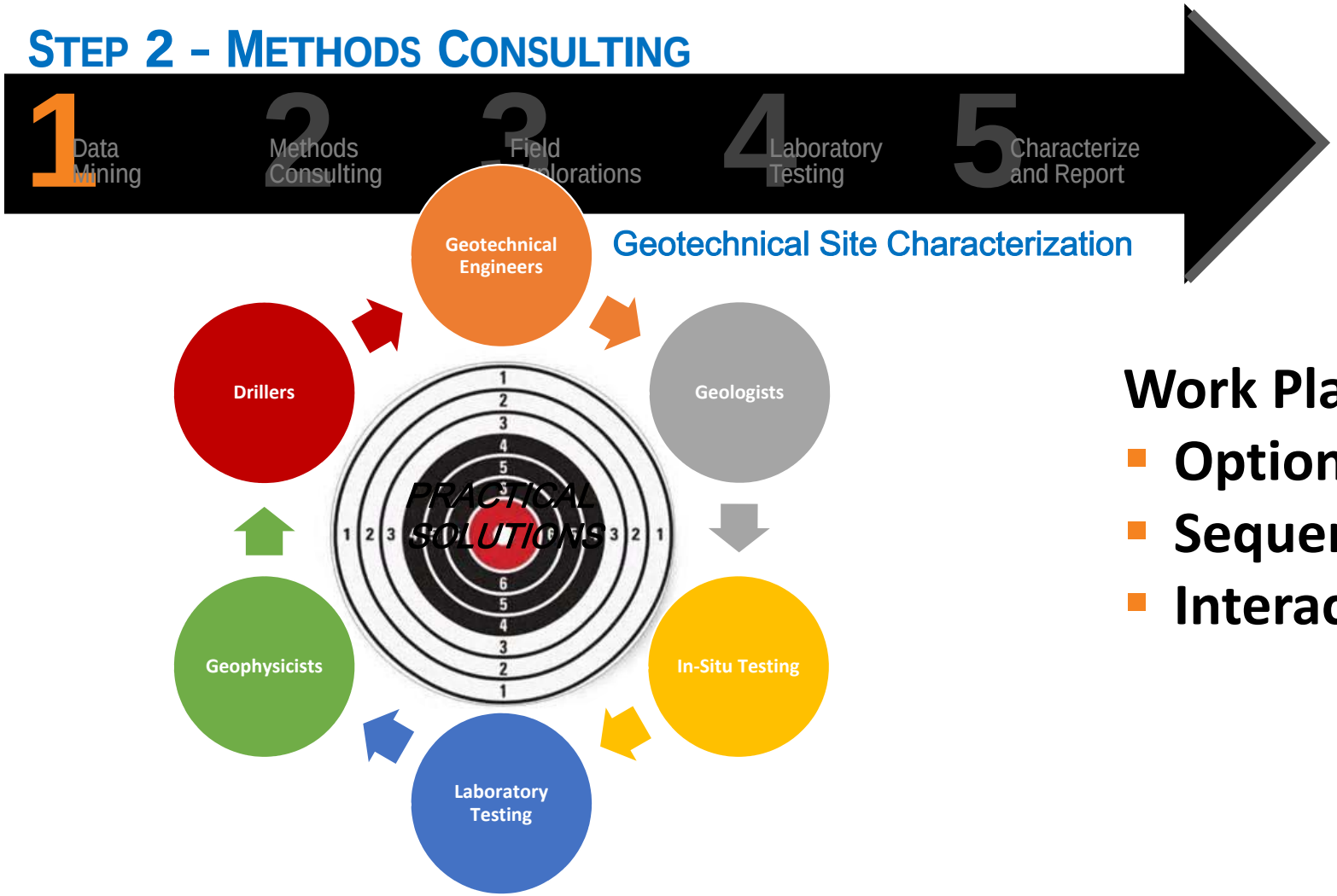
Enhanced with GIS Information

Allows Characterization & Preliminary Evaluation

STEP 1 – DATA MINING

WHAT ARE THE EXPECTED GEOTECHNICAL CONDITIONS?

Step 2 – Methods Consulting



Work Planning

- Options
- Sequence
- Interaction

Step 3 – Field Exploration

Step 3 – Field Exploration

1 Data Mining
2 Methods Consulting
3 Field Explorations
4 Laboratory Testing
5 Characterize and Report

Geotechnical Site Characterization

Drill/Sample

In-Situ Testing

Geophysical

Step 3 – Field Exploration

1 Data Mining
2 Methods Consulting
3 Field Explorations
4 Laboratory Testing
5 Characterize and Report

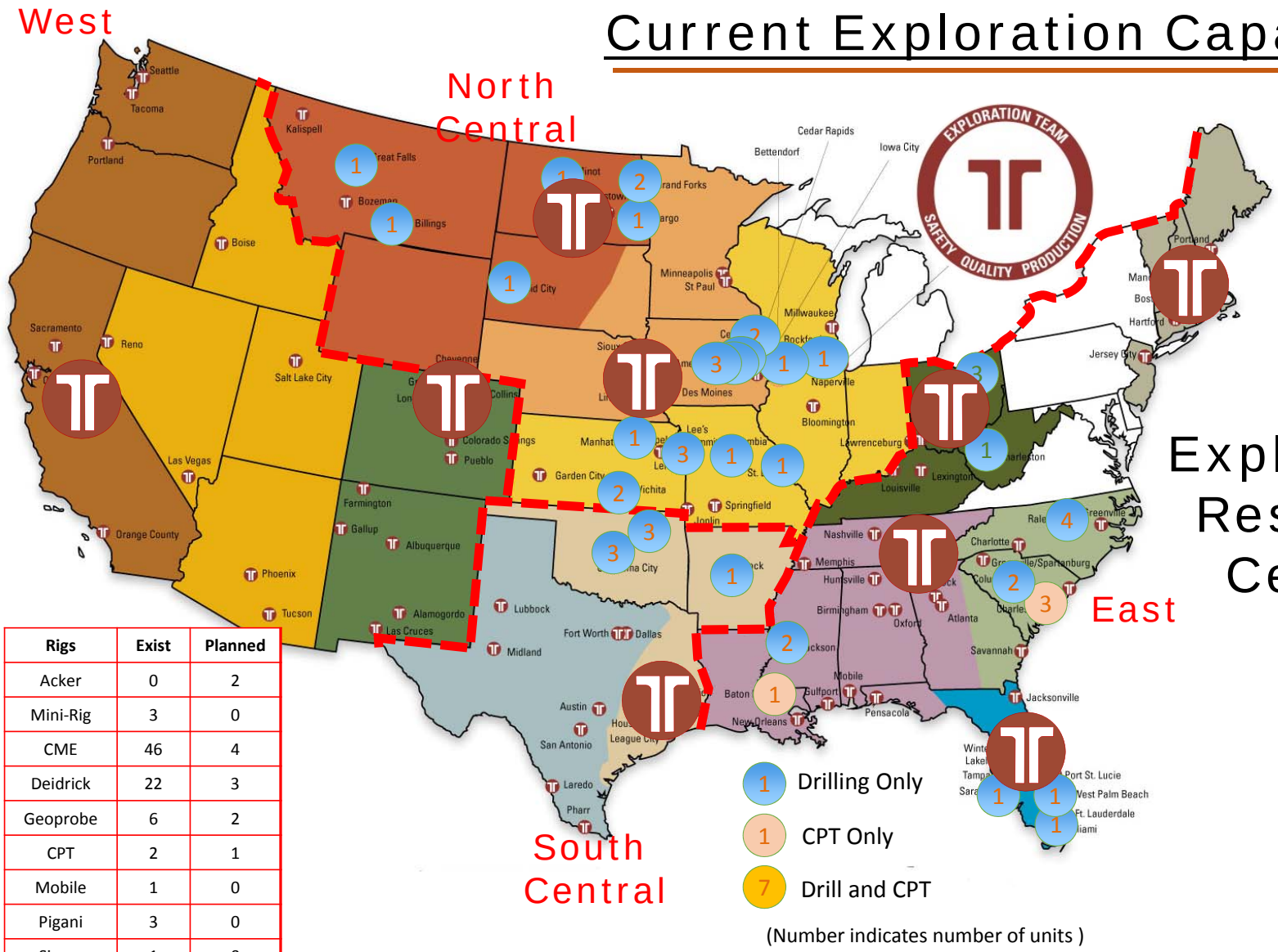
Geotechnical Site Characterization

Step 3 – Field Exploration

1 Data Mining
2 Methods Consulting
3 Field Explorations
4 Laboratory Testing
5 Characterize and Report

Geotechnical Site Characterization

Current Exploration Capabilities

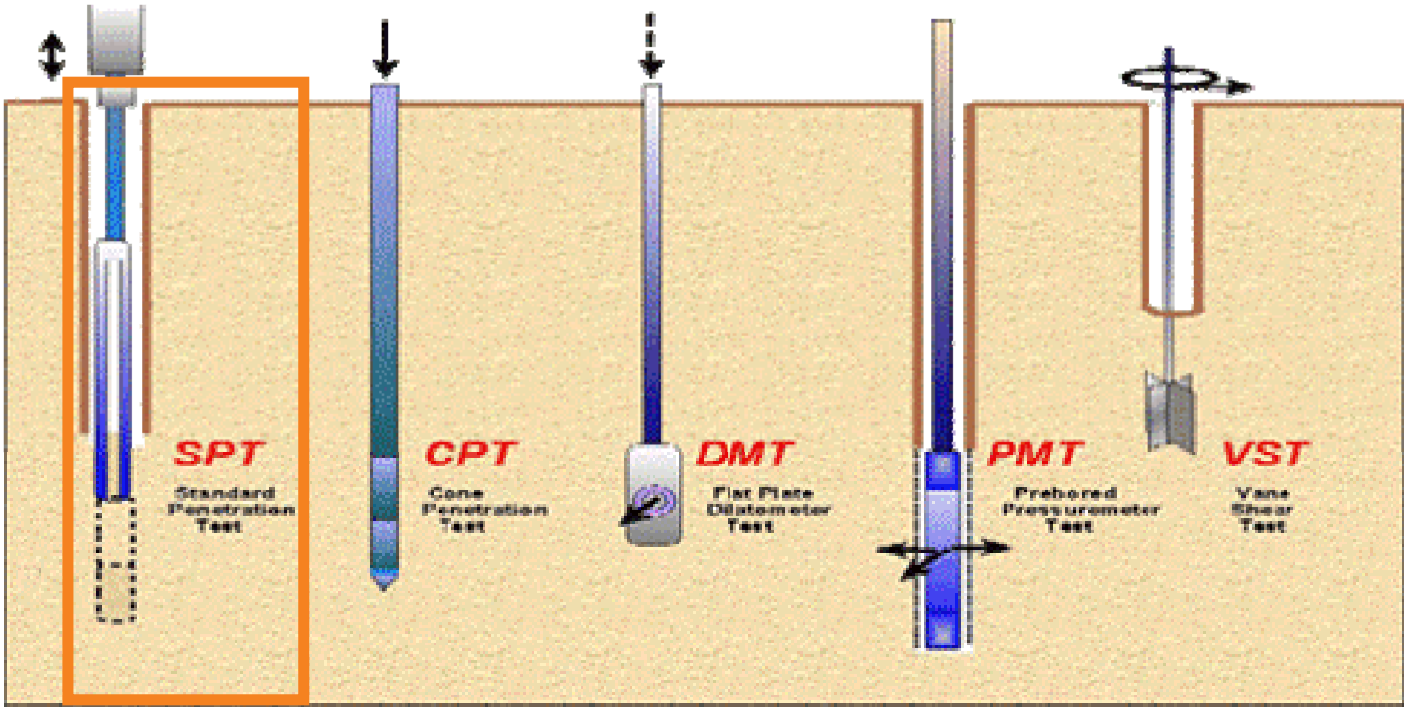


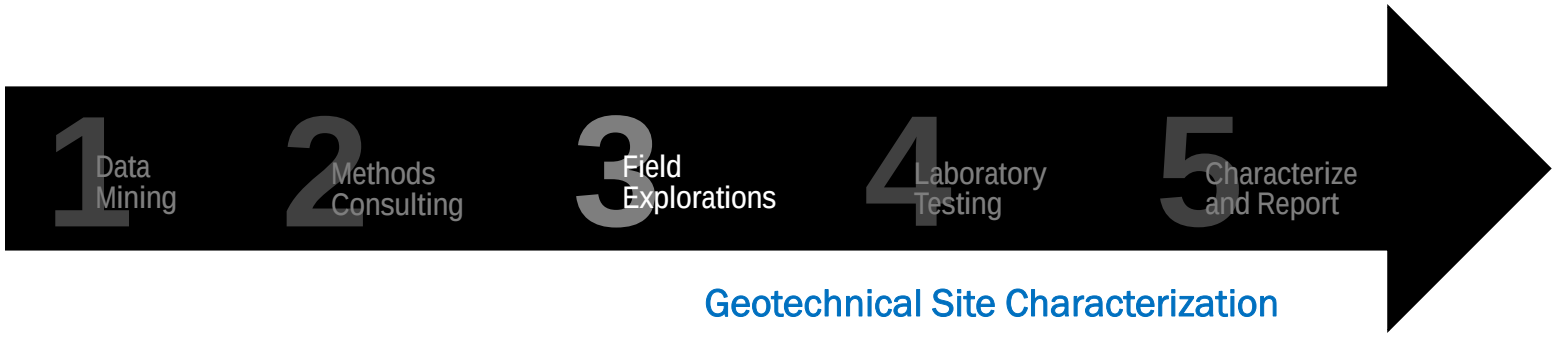
Rigs	Exist	Planned
Acker	0	2
Mini-Rig	3	0
CME	46	4
Deidrick	22	3
Geoprobe	6	2
CPT	2	1
Mobile	1	0
Pigani	3	0
Simco	1	0

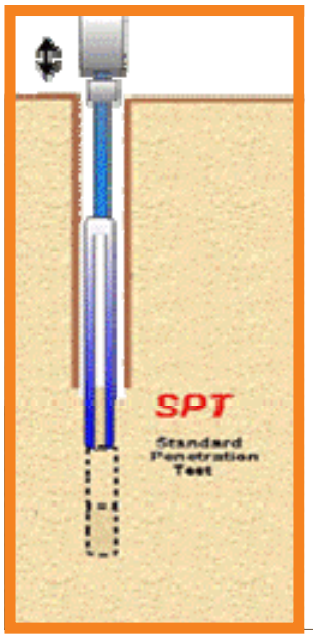
STEP 3 – FIELD EXPLORATION

1 Data Mining
2 Methods Consulting
3 Field Explorations
4 Laboratory Testing
5 Characterize and Report

Geotechnical Site Characterization







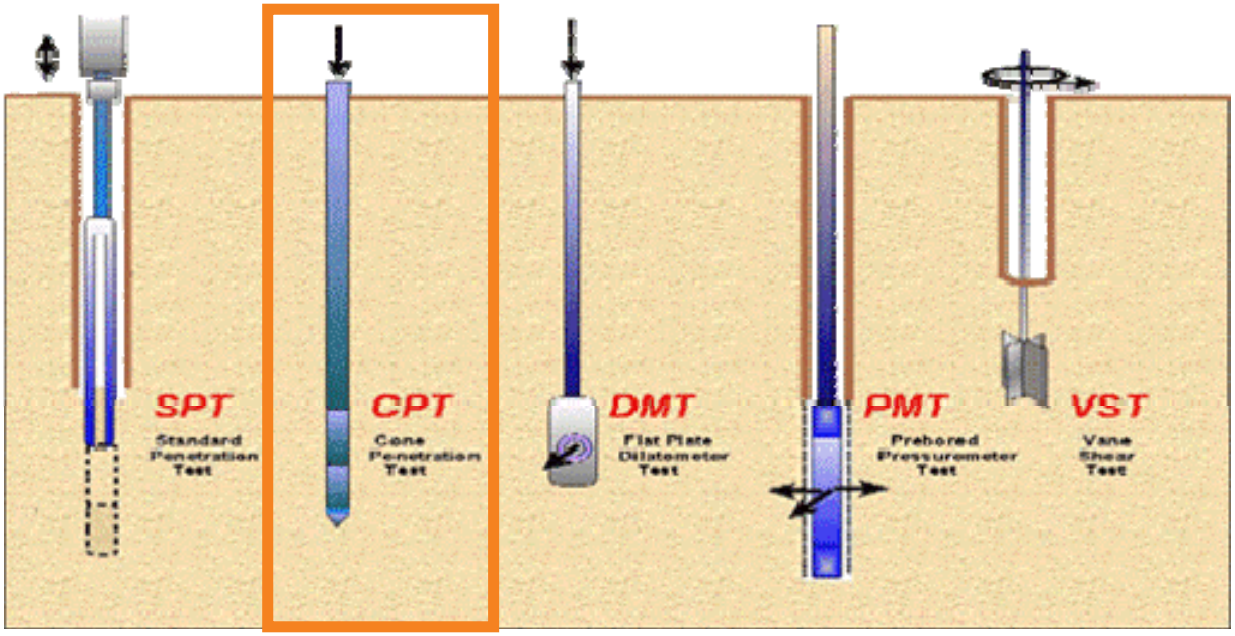
Standard Penetration Test

- The tried and proven" test
- Around for 100+ years
- In-situ Test (N value) but yields disturbed sample
- Intended for granular deposits (where sampling is difficult)
- Overused but state of the practice…

STEP 3 – FIELD EXPLORATION

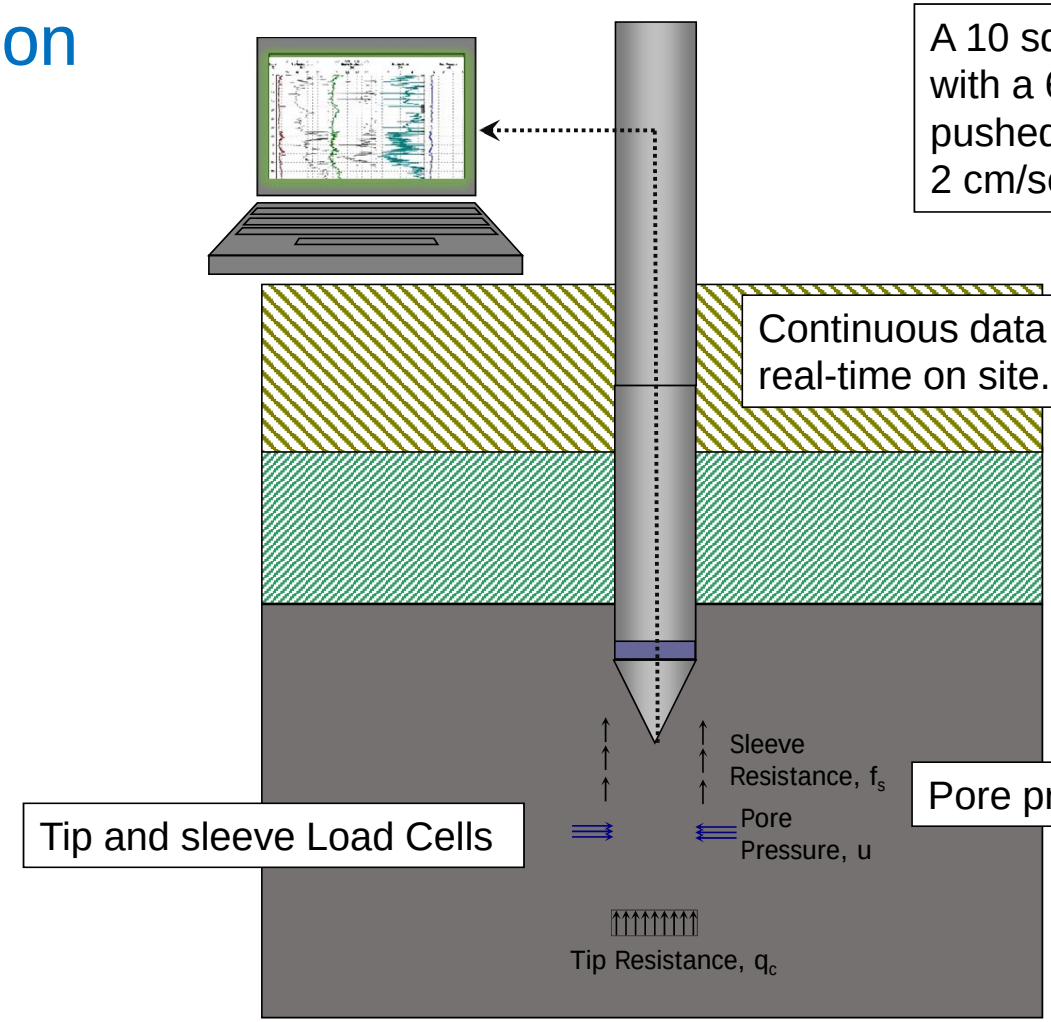
1 Data Mining
2 Methods Consulting
3 Field Explorations
4 Laboratory Testing
5 Characterize and Report

Geotechnical Site Characterization



Cone Penetration Testing

Cone Penetration Testing



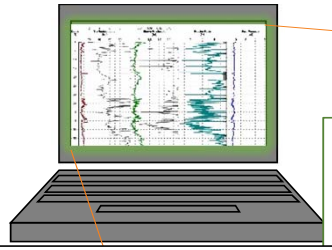
A 10 sq cm (1.4 in. dia.) probe with a 60° conical tip is pushed into the soil at a rate of 2 cm/sec (4 ft/min)

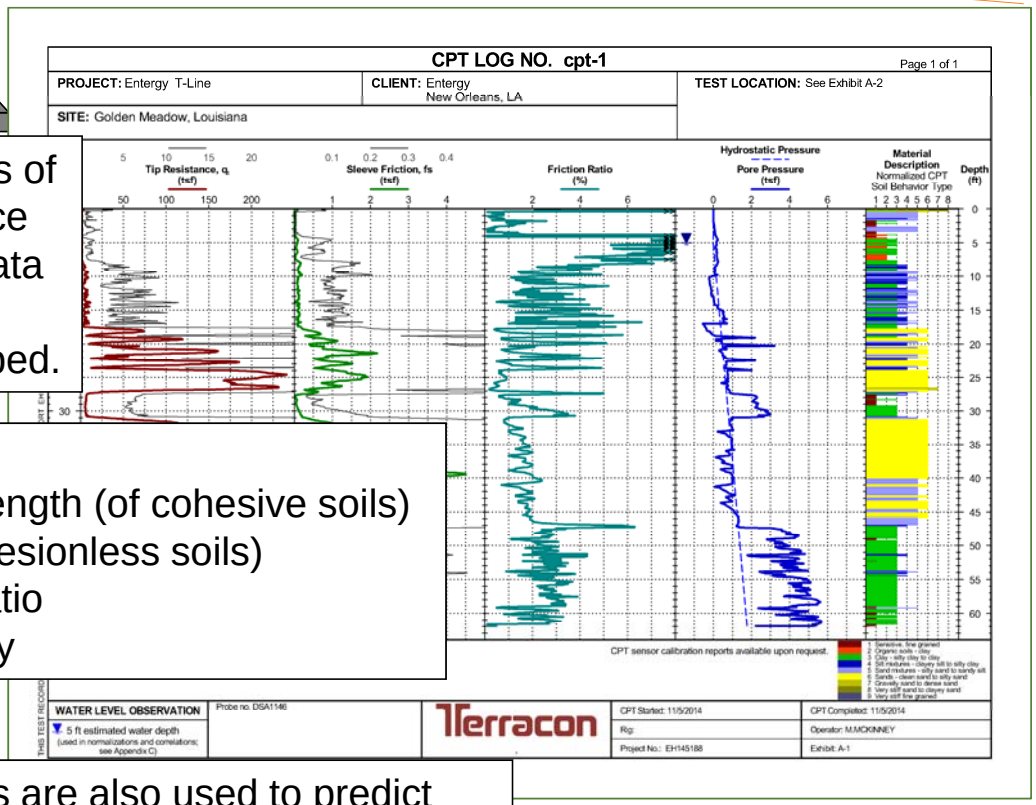
Continuous data collection transmitted real-time on site.

Tip and sleeve Load Cells

Pore pressure Transducer

Cone Penetration Testing



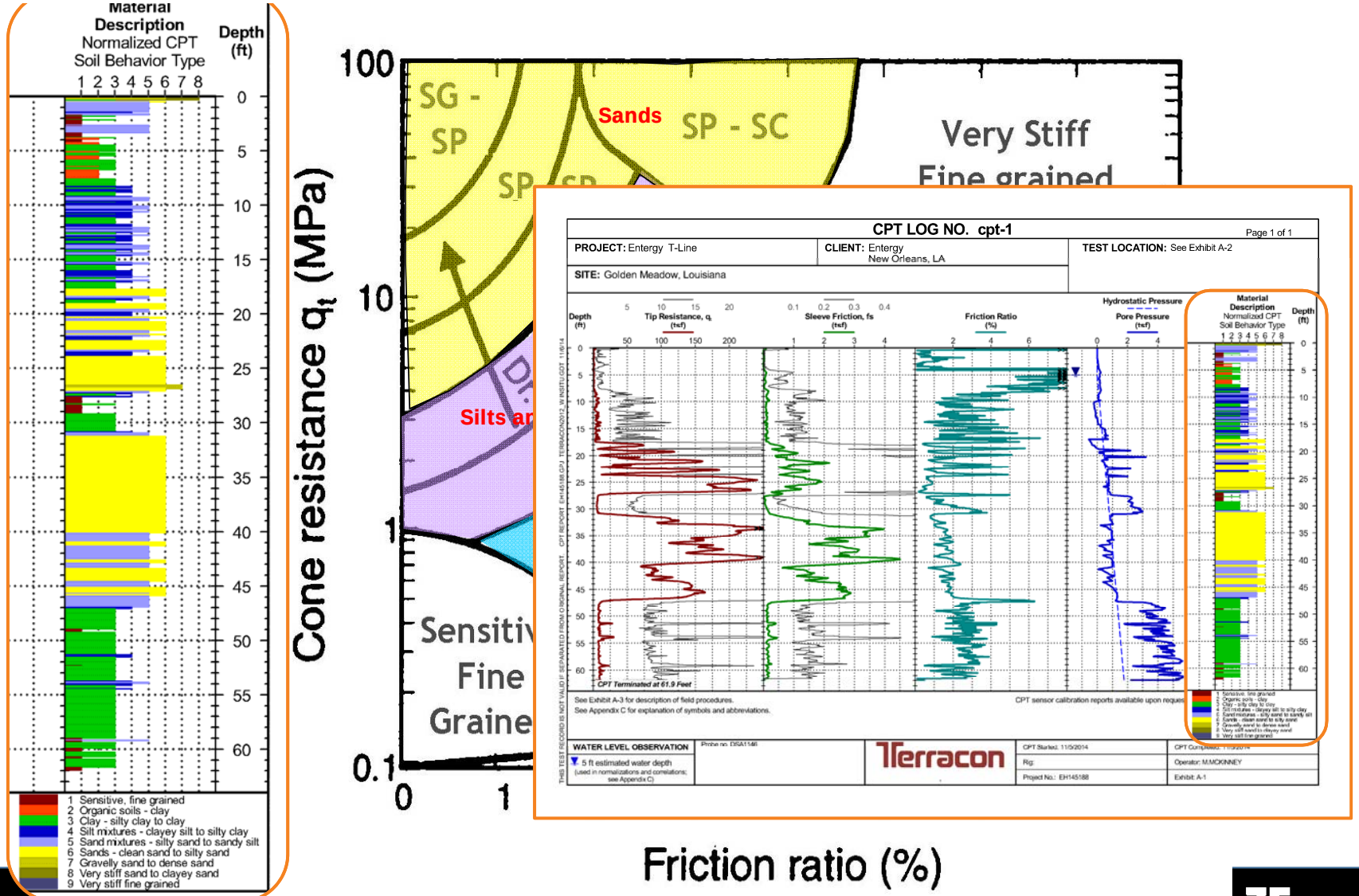


Using empirical correlations of the tip and sleeve resistance and pore water pressure data estimates of many soil parameters can be developed.

A few examples include:

- Undrained Shear Strength (of cohesive soils)
- Friction Angle (of cohesionless soils)
- Overconsolidation Ratio
- Hydraulic Conductivity

Empirical correlations are also used to predict soil behavior type.
The following slide illustrates this process.


Material Description
Normalized CPT Soil Behavior Type
Depth (ft)
1 2 3 4 5 6 7 8
1 Sensitive, fine grained
2 Organic soils - clay
3 Clay - silty clay to clay
4 Silt mixtures - clayey silt to silty clay
5 Sand mixtures - silty sand to sandy silt
6 Sands - clean sand to silty sand
7 Gravelly sand to dense sand
8 Very stiff sand to clayey sand
9 Very stiff fine grained
Cone resistance q_t (MPa)
SG - SP
Sands
SP - SC
Very Stiff
Fine grained
Silts ar
Sensitiv
Fine
Graine
Friction ratio (%)
CPT LOG NO. cpt-1
Page 1 of 1
PROJECT: Entergy T-Line
CLIENT: Entergy New Orleans, LA
TEST LOCATION: See Exhibit A-2
SITE: Golden Meadow, Louisiana
Depth (ft)
Tip Resistance, q_t (tsf)
Sleeve Friction, fs (tsf)
Friction Ratio (%)
Hydrostatic Pressure
Pore Pressure (tsf)
CPT Terminated at 61.9 Feet
See Exhibit A-3 for description of field procedures.
See Appendix C for explanation of symbols and abbreviations.
CPT sensor calibration reports available upon reques
WATER LEVEL OBSERVATION
5 ft estimated water depth
Terracon
CPT Started: 11/5/2014
Rig:
Project No.: EH145188
Operator: M.MCKINNEY
Exhibit: A-1

Terracon


VERTEK


VERTEK

1 Data Mining

2 Methods Consulting

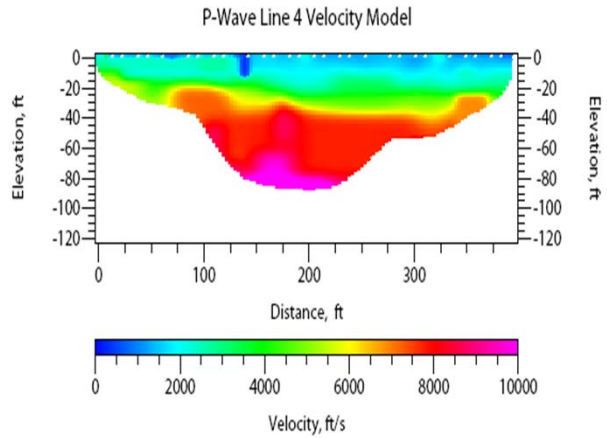
3 Field Explorations

4 Laboratory Testing

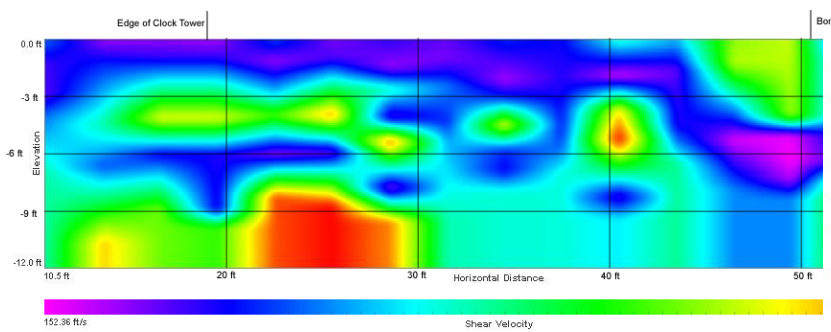
5 Characterize and Report

Geotechnical Site Characterization

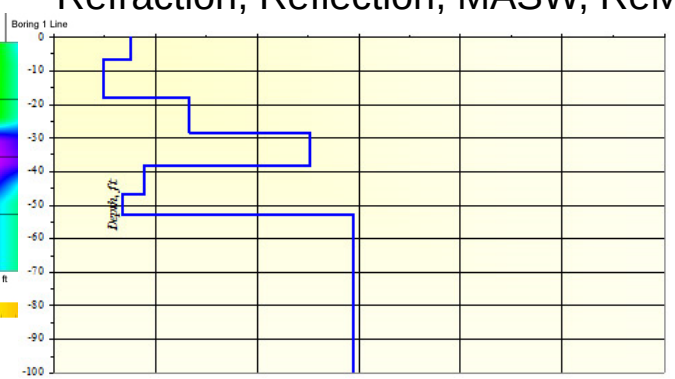
Geophysical Services



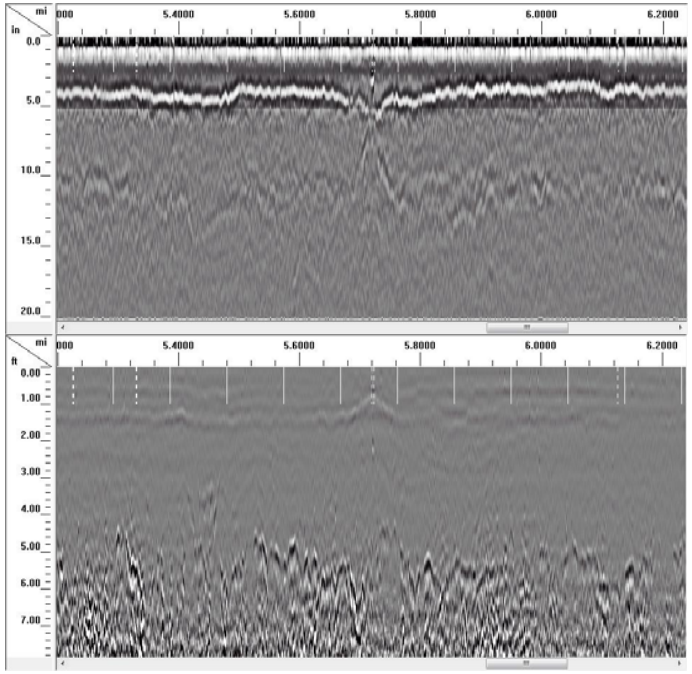
Seismic



Refraction, Reflection, MASW, ReMi, Downhole/Crosshole



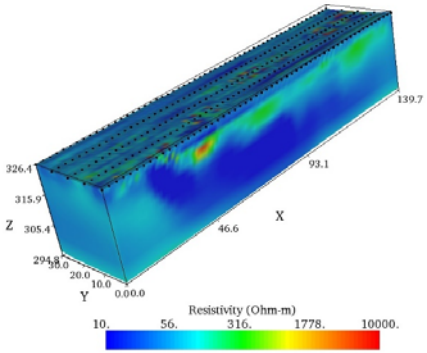
Geophysical Services

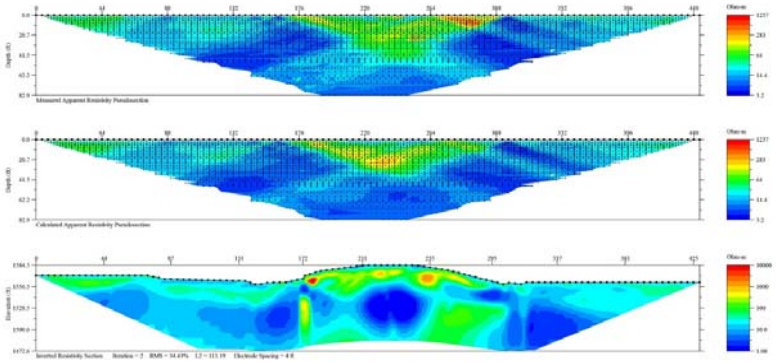


Ground-Penetrating Radar (GPR)
Time/Frequency Domain Electromagnetic
Magnetics

Geophysical Services

Resistivity



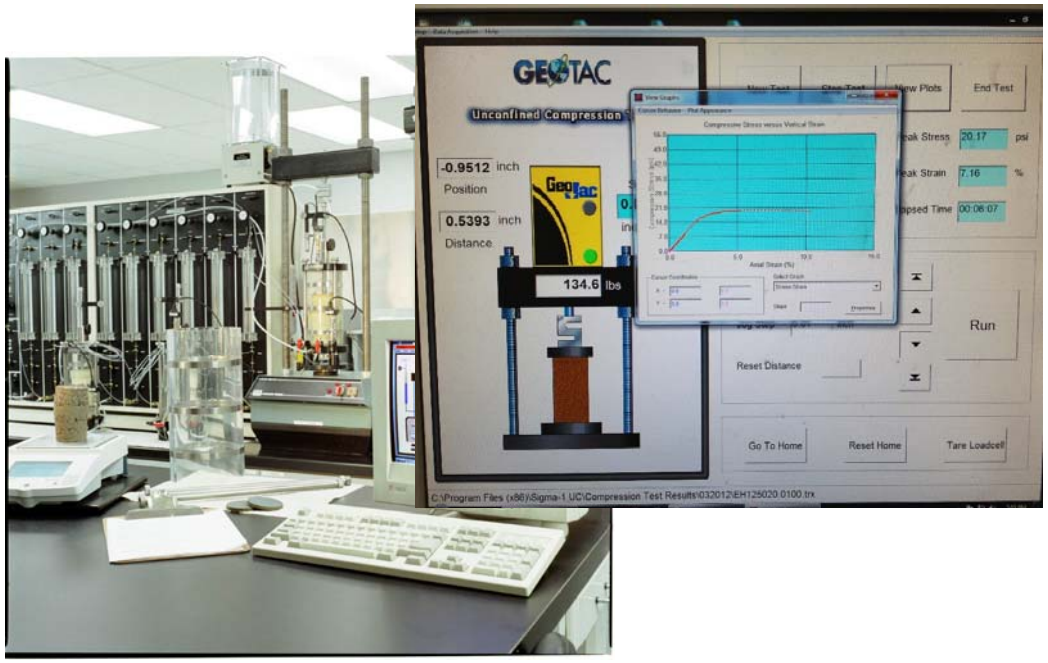


Electrical Resistivity Tomography (2D and 3D)
Induced Polarization and Spontaneous Potential
Wenner 4-pin to 1000’ A-spacings
Fall of Potential

Step 4 – Laboratory Testing

1 Data Mining
2 Methods Consulting
3 Field Explorations
4 Laboratory Testing
5 Characterize and Report

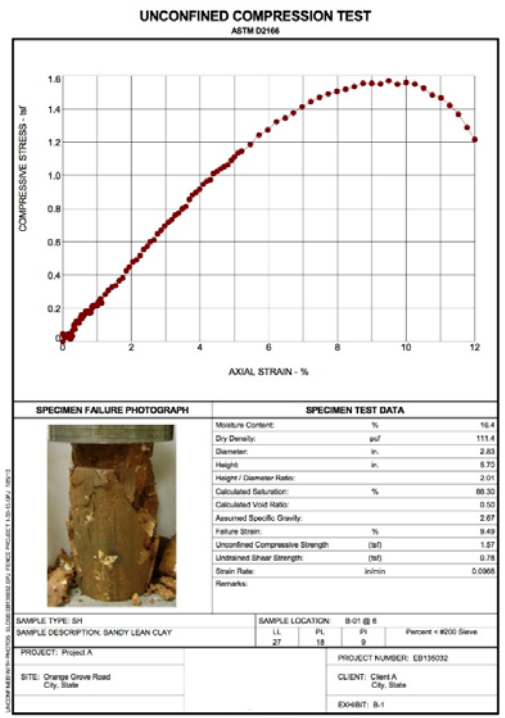
Geotechnical Site Characterization



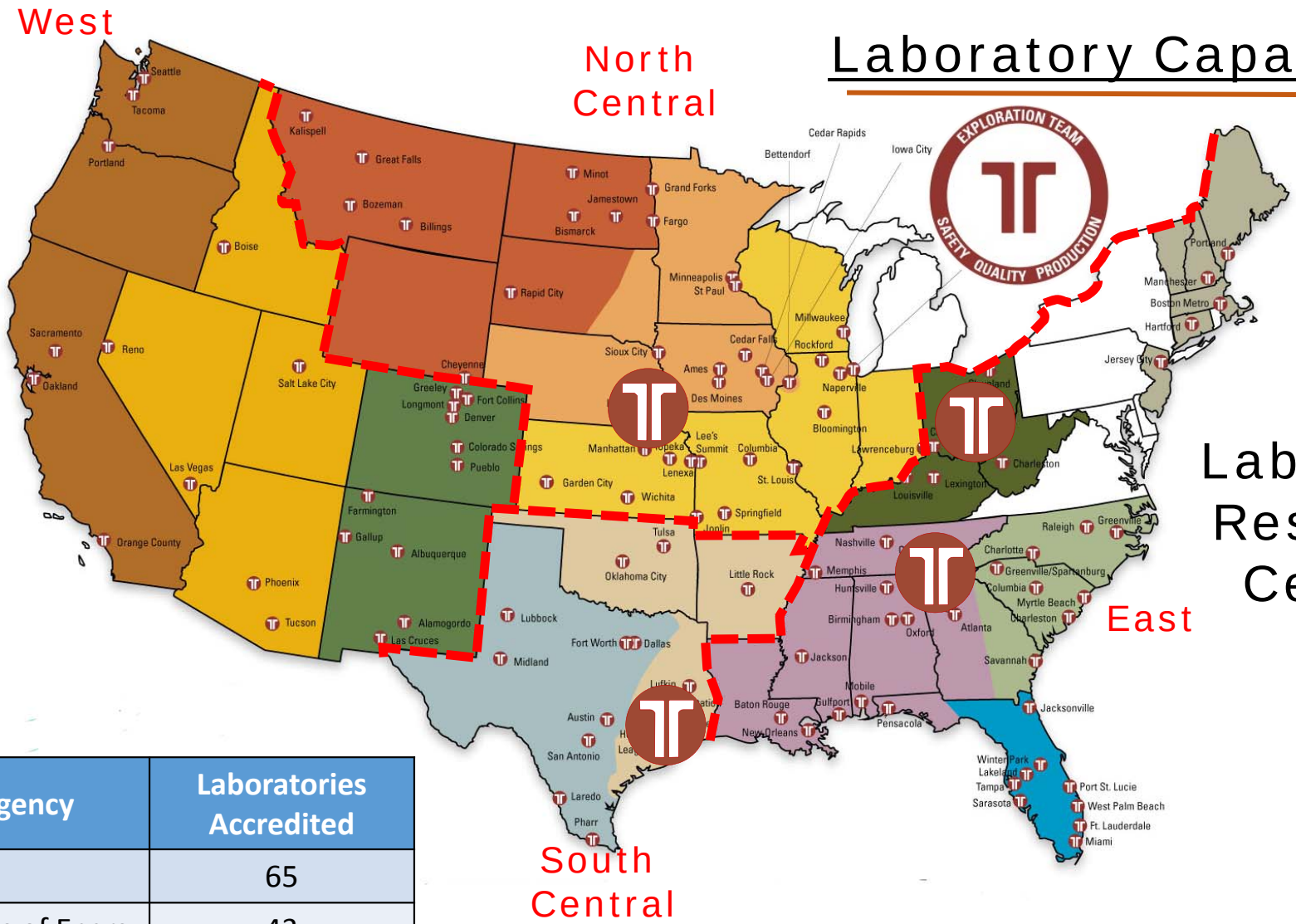
Step 4 – Laboratory Testing

1 Data Mining | 2 Methods Consulting | 3 Field Explorations | **4 Laboratory Testing** | 5 Characterize and Report

Geotechnical Site Characterization



Laboratory Capabilities



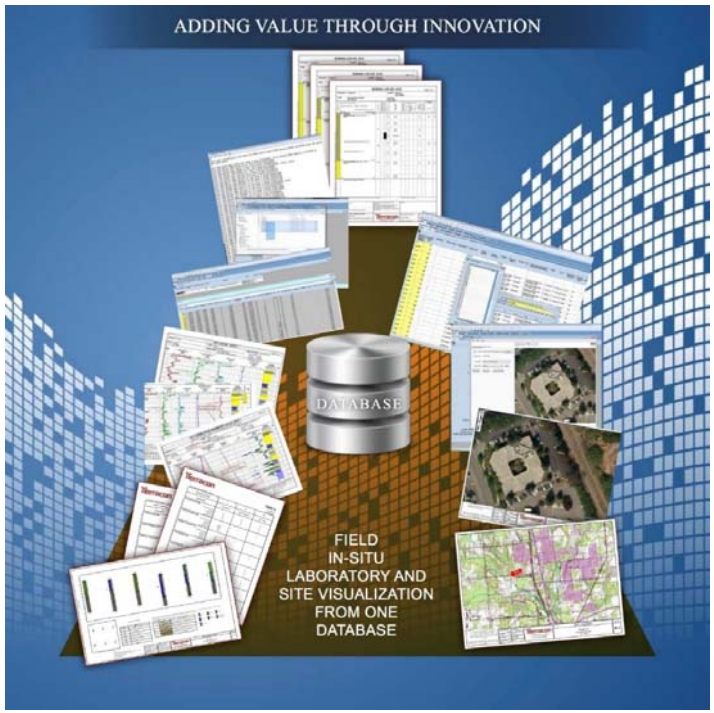
Laboratory Resource Centers

Accrediting Agency	Laboratories Accredited
AASTHO	65
US Army Corps of Engrs	43

Step 5 – Characterize and Report

1 Data Mining
2 Methods Consulting
3 Field Explorations
4 Laboratory Testing
5 Characterize and Report

Geotechnical Site Characterization

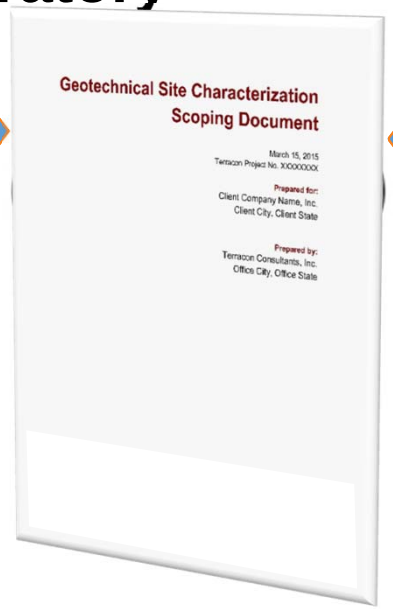


Terracon (Data)

- **Field**
- **Laboratory**

Client

- **Directives**
- **Information**



Geotechnical Site Characterization Services

1 Data Mining

2 Methods Consulting

3 Field Explorations

4 Laboratory Testing

5 Characterize and Report

In-Situ Testing

Laboratory Testing

Geophysical

Geotechnical Site Characterization Services

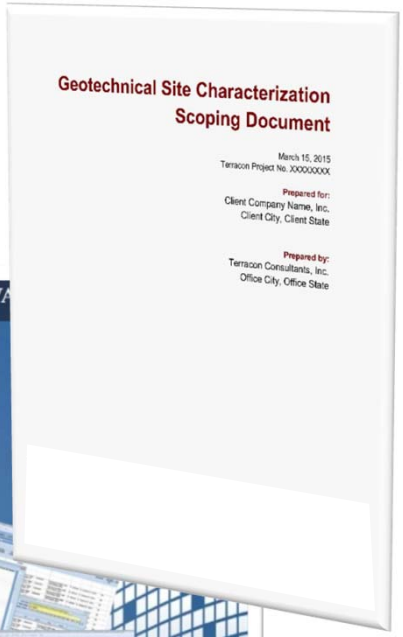
1 Data Mining

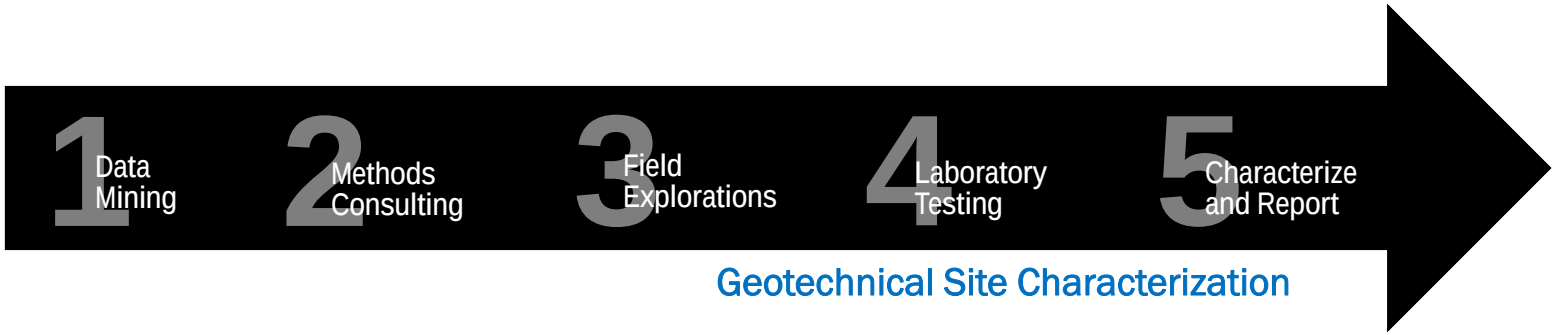
2 Methods Consulting

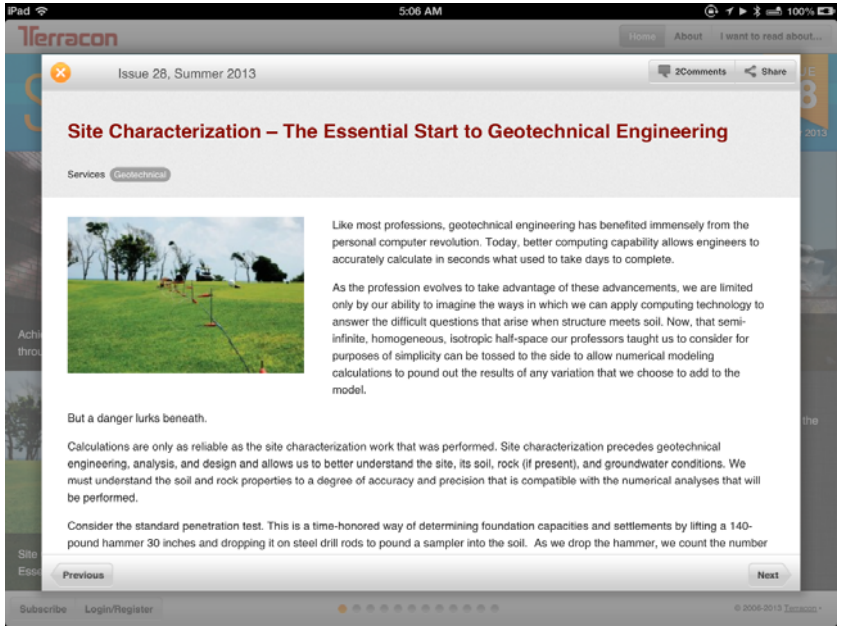
3 Field Explorations

4 Laboratory Testing

5 Characterize and Report







iPad 5:06 AM 100%

Terracon

Home About I want to read about...

Issue 28, Summer 2013

2Comments Share

Site Characterization – The Essential Start to Geotechnical Engineering

Services Geotechnical

Like most professions, geotechnical engineering has benefited immensely from the personal computer revolution. Today, better computing capability allows engineers to accurately calculate in seconds what used to take days to complete.

As the profession evolves to take advantage of these advancements, we are limited only by our ability to imagine the ways in which we can apply computing technology to answer the difficult questions that arise when structure meets soil. Now, that semi-infinite, homogeneous, isotropic half-space our professors taught us to consider for purposes of simplicity can be tossed to the side to allow numerical modeling calculations to pound out the results of any variation that we choose to add to the model.

But a danger lurks beneath.

Calculations are only as reliable as the site characterization work that was performed. Site characterization precedes geotechnical engineering, analysis, and design and allows us to better understand the site, its soil, rock (if present), and groundwater conditions. We must understand the soil and rock properties to a degree of accuracy and precision that is compatible with the numerical analyses that will be performed.

Consider the standard penetration test. This is a time-honored way of determining foundation capacities and settlements by lifting a 140-pound hammer 30 inches and dropping it on steel drill rods to pound a sampler into the soil. As we drop the hammer, we count the number

Previous Next

Subscribe Login/Register

© 2006-2013 Terracon

Geotechnical Engineering

Geotechnical Site Characterization

Comprehensive Geotechnical Consulting